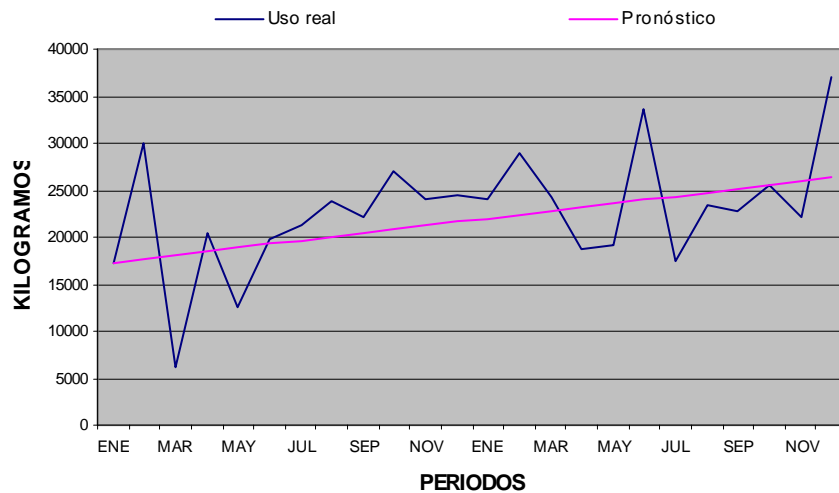


**REGRESIÓN LINEAL****MATERIA PRIMA 1**

	MES	KGS.	PERIODO	PRON.	ERR. ABS.
2002	ENE	17250	1	17339	0.00515942
	FEB	30015	2	17729	0.40932867
	MAR	6200	3	18118	1.92225806
	ABR	20450	4	18508	0.09496333
	MAY	12450	5	18897	0.51783133
	JUN	19755	6	19287	0.02369021
	JUL	21344	7	19676	0.07814843
	AGO	23875	8	20066	0.15953927
	SEP	22025	9	20455	0.07128263
	OCT	27110	10	20845	0.23109554
	NOV	23950	11	21234	0.11340292
	DIC	24550	12	21624	0.11918534
2003	ENE	23950	13	22013	0.08087683
	FEB	28900	14	22403	0.22480969
	MAR	24150	15	22792	0.05623188
	ABR	18625	16	23182	0.24467114
	MAY	19125	17	23571	0.23247059
	JUN	33600	18	23960	0.28690476
	JUL	17550	19	24350	0.38746439
	AGO	23325	20	24739	0.06062165
	SEP	22750	21	25129	0.10457143
	OCT	25607	22	25518	0.00347561
	NOV	22055	23	25908	0.17469961
	DIC	36943	24	26297	0.28817367
<b>MAPE</b>				<b>0.24545</b>	

Ecuación de la regresión

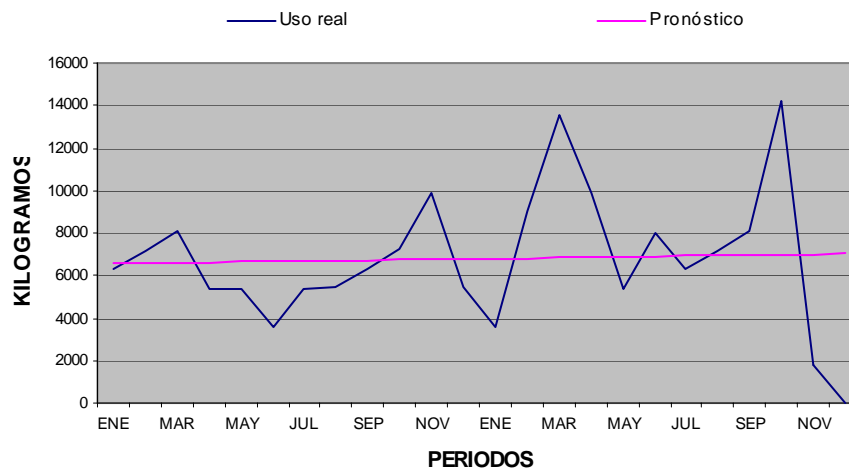
$$Y = 17863 + 389.473X$$



**REGRESIÓN LINEAL****MATERIA PRIMA 2**

	MES	KGS.	PERIODO	PRON.	ERR. ABS.
2002	ENE	6300	1	6557	0.04079365
	FEB	7200	2	6577	0.08652778
	MAR	8100	3	6597	0.18555556
	ABR	5400	4	6618	0.22555556
	MAY	5400	5	6638	0.22925926
	JUN	3600	6	6658	0.84944444
	JUL	5400	7	6678	0.23666667
	AGO	5500	8	6699	0.218
	SEP	6300	9	6719	0.06650794
	OCT	7227	10	6739	0.06752456
	NOV	9900	11	6760	0.31717172
	DIC	5500	12	6780	0.23272727
2003	ENE	3600	13	6800	0.88888889
	FEB	9000	14	6820	0.24222222
	MAR	13552	15	6841	0.49520366
	ABR	9900	16	6861	0.3069697
	MAY	5400	17	6881	0.27425926
	JUN	8021	18	6902	0.13950879
	JUL	6300	19	6922	0.09873016
	AGO	7200	20	6942	0.03583333
	SEP	8100	21	6962	0.14049383
	OCT	14247	22	6983	0.50986173
	NOV	1800	23	7003	2.89055556
	DIC	10	24	7023	701.3
<b>MAPE</b>				<b>29.58659</b>	

Ecuación de la regresión  
 $Y = 6535.931 + 20.28217X$

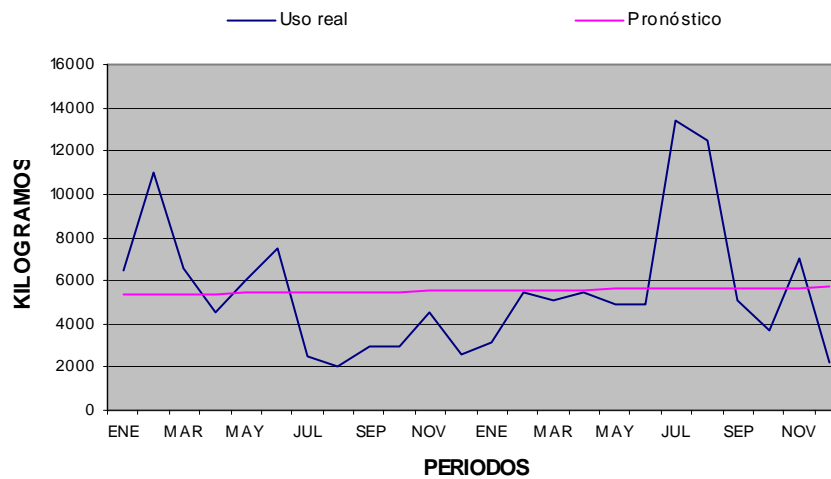


**REGRESIÓN LINEAL****MATERIA PRIMA 3**

	MES	KGS.	PERIODO	PRON.	ERR. ABS.
2002	ENE	6500	1	5360	0.17538462
	FEB	11000	2	5375	0.51136364
	MAR	6531	3	5389	0.17485837
	ABR	4500	4	5404	0.20088889
	MAY	6000	5	5419	0.09683333
	JUN	7500	6	5434	0.27546667
	JUL	2500	7	5448	1.1792
	AGO	2000	8	5463	1.7315
	SEP	3000	9	5478	0.826
	OCT	3000	10	5493	0.831
	NOV	4500	11	5508	0.224
	DIC	2600	12	5522	1.12384615
2003	ENE	3160	13	5537	0.75221519
	FEB	5500	14	5552	0.00945455
	MAR	5080	15	5567	0.09586614
	ABR	5500	16	5581	0.01472727
	MAY	4900	17	5596	0.14204082
	JUN	4900	18	5611	0.14510204
	JUL	13456	19	5626	0.58189655
	AGO	12514	20	5640	0.54930478
	SEP	5085	21	5655	0.1120944
	OCT	3690	22	5670	0.53658537
	NOV	7075	23	5685	0.19646643
	DIC	2210	24	5700	1.57918552
<b>MAPE</b>				<b>0.50272</b>	

Ecuación de la regresión

$$Y = 5344.594 + 1320.475X$$

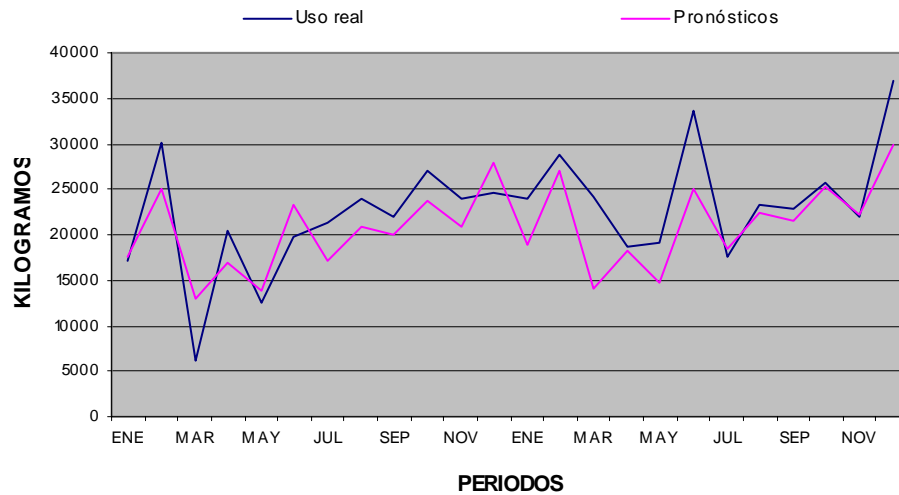


## SERIES DE TIEMPO CON ESTACIONALIDAD

### MATERIA PRIMA 1

	MES	KGS.	PERIODO	PROM.MEN.	IND. EST.	USO SIN. EST.	PRON. SIN EST.	PRON CON EST.	ERR. ABS.
2002	ENE	17250	1	20600	0.9062348	19034.80279	19293.60566	17484.53616	0.081443798
	FEB	30015	2	29457.5	1.2958937	23161.6217	19417.08271	25162.47546	0.0863866
	MAR	6200	3	15175	0.6675783	9287.300384	19540.55977	13044.85325	0.404590431
	ABR	20450	4	19537.5	0.8594933	23793.08872	19664.03682	16901.10762	0.289663153
	MAY	12450	5	15787.5	0.6945234	17925.96279	19787.51388	13742.89073	0.233352714
	JUN	19755	6	26677.5	1.173596	16832.87925	19910.99093	23367.4596	0.388203364
	JUL	21344	7	19447	0.855512	24948.80225	20034.46799	17139.72801	0.313003974
	AGO	23875	8	23600	1.0382107	22996.29546	20157.94504	20928.19422	0.08993193
	SEP	22025	9	22387.5	0.9848704	22363.34794	20281.4221	19974.5728	0.106816526
	OCT	27110	10	26358.5	1.1595626	23379.50588	20404.89915	23660.75736	0.01202983
	NOV	23950	11	23002.5	1.0119255	23667.75043	20528.3762	20773.1872	0.122299888
	DIC	24550	12	30746.5	1.3525994	18150.23756	20651.85326	27933.68383	0.539025797
2003	ENE	23950	13	TOTAL	0.9062348	26428.03054	20775.33031	18827.32655	0.287600091
	FEB	28900	14	22731.41667	1.2958937	22301.21163	20898.80737	27082.63313	0.214401871
	MAR	24150	15		0.6675783	36175.53295	21022.28442	14034.02044	0.612057673
	ABR	18625	16		0.8594933	21669.74462	21145.76148	18174.64001	0.161289608
	MAY	19125	17		0.6945234	27536.87055	21269.23853	14771.98312	0.463556213
	JUN	33600	18		1.173596	28629.95408	21392.71559	25106.40575	0.123072092
	JUL	17550	19		0.855512	20514.03108	21516.19264	18407.36125	0.102694094
	AGO	23325	20		1.0382107	22466.53787	21639.6697	22466.53661	5.59703E-08
	SEP	22750	21		0.9848704	23099.48539	21763.14675	21433.8796	0.072105753
	OCT	25607	22		1.1595626	22083.32745	21886.6238	25378.90982	0.149233958
	NOV	22055	23		1.0119255	21795.08291	22010.10086	22272.58215	0.021908576
	DIC	36943	24		1.3525994	27312.59577	22133.57791	29937.86368	0.096119312
<b>MAPE</b>								<b>0.20711</b>	

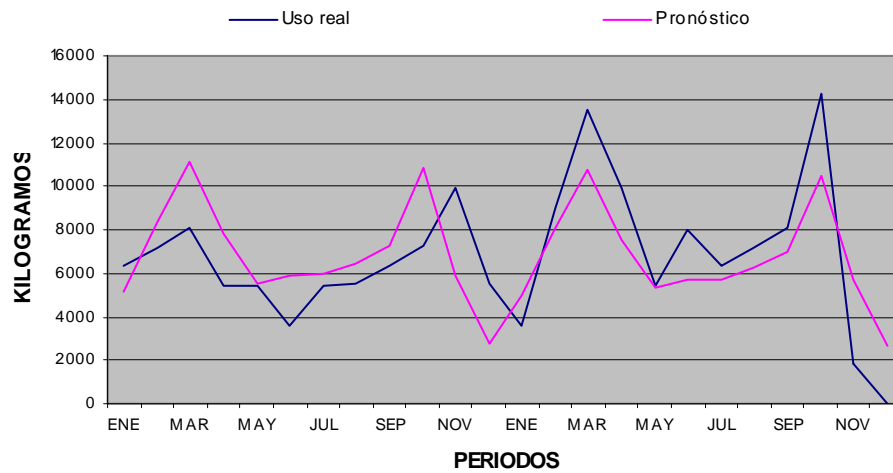
Ecuación de la regresión  
 $Y = 19172.36 + 187.006122X$



**SERIES DE TIEMPO CON ESTACIONALIDAD**  
**MATERIA PRIMA 2**

		KGS.	PERIODO	PROM.MEN.	IND. EST.	USO SIN. EST.	PRON. SIN EST.	PRON CON EST.	ERR. ABS.
2002	ENE	6300	1	4950	0.7290267	8641.659091	7006	5107.56089	0.408960613
	FEB	7200	2	8100	1.1929527	6035.444444	6987	8335.160809	0.381035131
	MAR	8100	3	10826	1.5944329	5080.176196	6968	11110.00836	1.186933667
	ABR	5400	4	7650	1.1266776	4792.852941	6949	7829.282571	0.633532818
	MAY	5400	5	5400	0.7953018	6789.875	6931	5512.23697	0.188168122
	JUN	3600	6	5810.5	0.8557595	4206.789433	6912	5915.009628	0.406062681
	JUL	5400	7	5850	0.861577	6267.576923	6893	5938.850126	0.052448785
	AGO	5500	8	6350	0.935216	5880.994094	6874	6428.675049	0.093127275
	SEP	6300	9	7200	1.0604024	5941.140625	6856	7270.119111	0.223690798
	OCT	7227	10	10737	1.5813251	4570.217624	6837	10811.51995	1.365646636
	NOV	9900	11	5850	0.861577	11490.55769	6818	5874.231853	0.488777481
	DIC	5500	12	2755	0.4057512	13555.10436	6799	2758.70248	0.796482387
2003	ENE	3600	13	TOTAL	0.7290714	4937.787879	6781	4943.833271	0.001224312
	FEB	9000	14	6789.875	1.193026	7543.842593	6762	8067.241496	0.069380942
	MAR	13552	15	1.5945307	8499.05222	6743	10751.92076	0.265072914	
	ABR	9900	16	1.1267467	8786.357843	6724	7576.245037	0.137726328	
	MAY	5400	17	0.7953506	6789.458333	6706	5333.621362	0.214426085	
	JUN	8021	18	0.855812	9372.385387	6687	5722.814928	0.389396115	
	JUL	6300	19	0.8616299	7311.724359	6668	5745.347874	0.214228055	
	AGO	7200	20	0.9352734	7698.283465	6649	6218.633052	0.192205239	
	SEP	8100	21	1.0604675	7638.140625	6630	7030.899618	0.079501156	
	OCT	14247	22	1.5814222	9008.979498	6612	10456.36346	0.160660146	
	NOV	1800	23	0.8616299	2089.064103	6593	5680.725635	1.719268225	
	DIC	10	24	0.4050397	24.68893939	6574	2662.730827	106.851163	
<b>MAPE</b>								<b>4.58496</b>	

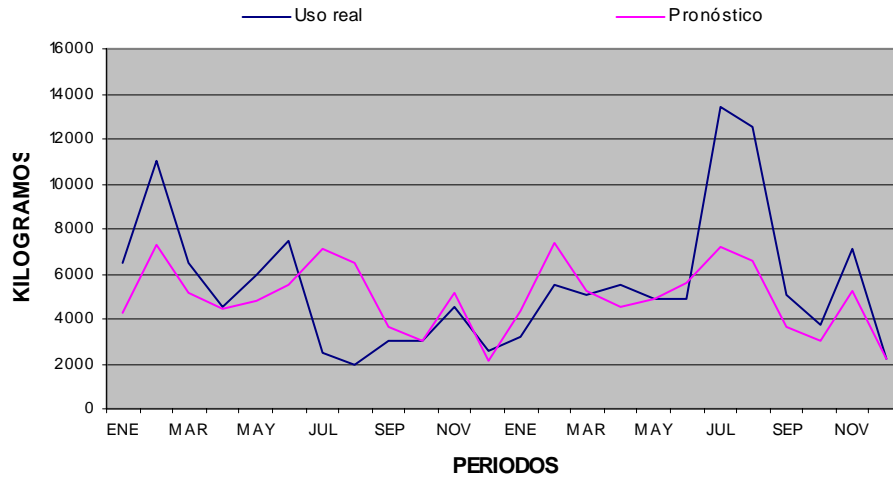
Ecuación de la regresión  
 $Y = 7024.03534 - 18.7661603X$



**SERIES DE TIEMPO CON ESTACIONALIDAD**  
**MATERIA PRIMA 3**

	MES	KGS.	PERIODO	PROM.MEN.	IND. EST.	USO SIN. EST.	PRON. SIN EST.	PRON CON EST.	ERR.ABS.
2002	ENE	6500	1	4830	0.8735428	7440.963596	4882.117167	4264.738186	0.426856733
	FEB	11000	2	8250	1.4920762	7372.277778	4887.685771	7292.799472	0.010780699
	MAR	6531	3	5805.5	1.0499695	6220.180798	4893.254375	5137.767753	0.174016332
	ABR	4500	4	5000	0.9042886	4976.2875	4898.822979	4429.949718	0.109788227
	MAY	6000	5	5450	0.9856746	6087.201835	4904.391583	4834.134024	0.205852844
	JUN	7500	6	6200	1.1213178	6688.558468	4909.960187	5505.626	0.176859105
	JUL	2500	7	7978	1.4428829	1732.642371	4915.528791	7092.5323	3.09347735
	AGO	2000	8	7257	1.3124845	1523.827569	4921.097395	6458.863845	3.238579205
	SEP	3000	9	4042.5	0.7311173	4103.308596	4926.665999	3601.970861	0.122178901
	OCT	3000	10	3345	0.6049691	4958.931241	4932.234603	2983.84936	0.398287813
	NOV	4500	11	5787.5	1.046714	4299.168467	4937.803207	5168.46795	0.202201772
	DIC	2600	12	2405	0.4349628	5977.522523	4943.371811	2150.182899	0.640288616
2003	ENE	3160	13	TOTAL	0.8735428	3617.453071	4948.940415	4323.111152	0.195070417
	FEB	5500	14	5529.208333	1.4920762	3686.138889	4954.509019	7392.504848	1.005487333
	MAR	5080	15		1.0499695	4838.235868	4960.077623	5207.930124	0.076410962
	ABR	5500	16		0.9042886	6082.129167	4965.646227	4490.377218	0.261709659
	MAY	4900	17		0.9856746	4971.214832	4971.214831	4899.999999	0.014325439
	JUN	4900	18		1.1213178	4369.858199	4976.783435	5580.556101	0.277056565
	JUL	13456	19		1.4428829	9325.774296	4982.352039	7188.950419	0.229130988
	AGO	12514	20		1.3124845	9534.589098	4987.920643	6546.568319	0.313387472
	SEP	5085	21		0.7311173	6955.108071	4993.489247	3650.826495	0.475087021
	OCT	3690	22		0.6049691	6099.485426	4999.057851	3024.275358	0.504175328
	NOV	7075	23		1.046714	6759.2482	5004.626455	5238.412782	0.225000677
	DIC	2210	24		0.4349628	5080.894144	5010.195059	2179.248527	0.571089563
<b>MAPE</b>									<b>0.53946</b>

Ecuación de la regresión  
 $Y = 4876.54856 + 5.568603X$



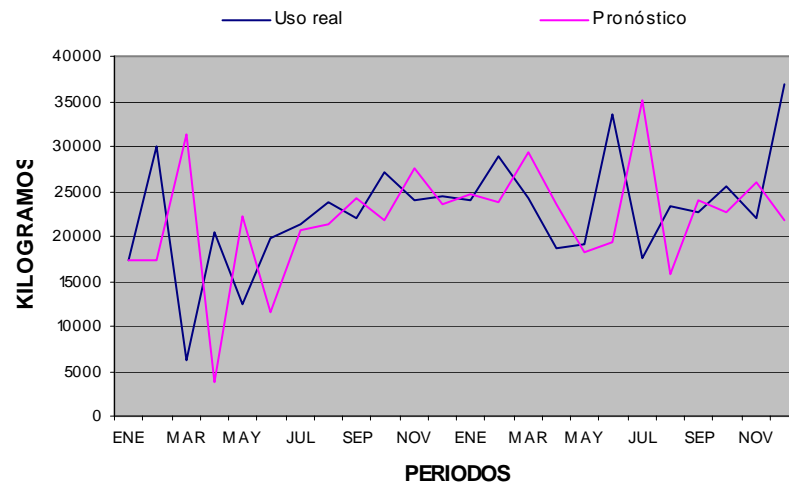
## SUAVIZAMIENTO EXPONENCIAL SIMPLE

### MATERIA PRIMA 1

	MES	KGS (A)	PERIODO	PRON (F)	ERR. ABS.
2002	ENE	17250	1	17250	0
	FEB	30015	2	17250	0.42528736
	MAR	6200	3	31292	4.04709677
	ABR	20450	4	3691	0.819511
	MAY	12450	5	22126	0.77718876
	JUN	19755	6	11483	0.41872944
	JUL	21344	7	20583	0.03565405
	AGO	23875	8	21421	0.10278534
	SEP	22025	9	24121	0.09516459
	OCT	27110	10	21816	0.1952785
	NOV	23950	11	27640	0.15407098
	DIC	24550	12	23581	0.03947047
2003	ENE	23950	13	24647	0.0291023
	FEB	28900	14	23881	0.17366782
	MAR	24150	15	29402	0.21747412
	ABR	18625	16	23625	0.26845638
	MAY	19125	17	18125	0.05228758
	JUN	33600	18	19225	0.42782738
	JUL	17550	19	35038	0.99646724
	AGO	23325	20	15802	0.32252947
	SEP	22750	21	24078	0.05837363
	OCT	25607	22	22618	0.1167259
	NOV	22055	23	25906	0.17460893
	DIC	36943	24	21670	0.41342068
<b>MAPE</b>				<b>0.43171</b>	

Valor de constante de suavizamiento

$$\alpha = 0.1$$

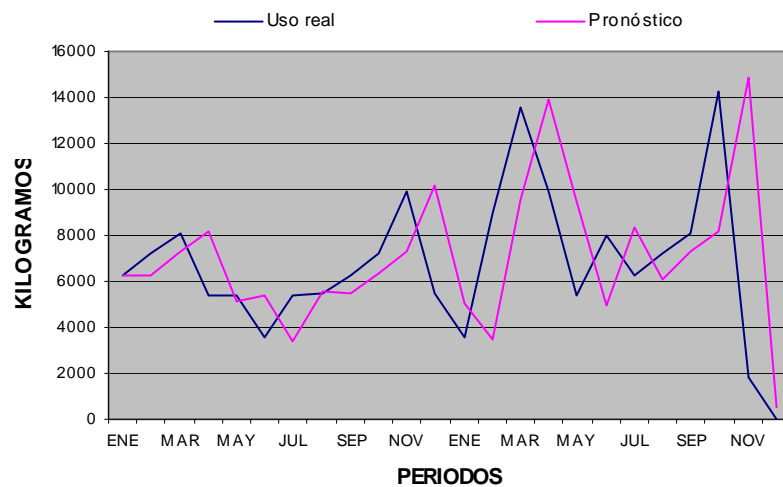


**SUAVIZAMIENTO EXPONENCIAL SIMPLE**  
**MATERIA PRIMA 2**

	MES	KGS (A)	PERIODO	PRON (F)	ERR. ABS.
2002	ENE	6300	1	6300	0
	FEB	7200	2	6300	0.125
	MAR	8100	3	7290	0.1
	ABR	5400	4	8181	0.515
	MAY	5400	5	5122	0.05148148
	JUN	3600	6	5428	0.50777778
	JUL	5400	7	3418	0.36703704
	AGO	5500	8	5599	0.018
	SEP	6300	9	5491	0.1284127
	OCT	7227	10	6381	0.11706102
	NOV	9900	11	7312	0.26141414
	DIC	5500	12	10159	0.84709091
2003	ENE	3600	13	5035	0.39861111
	FEB	9000	14	3457	0.61588889
	MAR	13552	15	9555	0.29493802
	ABR	9900	16	13952	0.40929293
	MAY	5400	17	9495	0.75833333
	JUN	8021	18	4991	0.37775838
	JUL	6300	19	8324	0.32126984
	AGO	7200	20	6098	0.15305556
	SEP	8100	21	7311	0.09740741
	OCT	14247	22	8179	0.42591423
	NOV	1800	23	14854	7.25222222
	DIC	10	24	495	48.5
<b>MAPE</b>				<b>2.61012</b>	

Valor de constante de suavizamiento

$$\alpha = 0.1$$

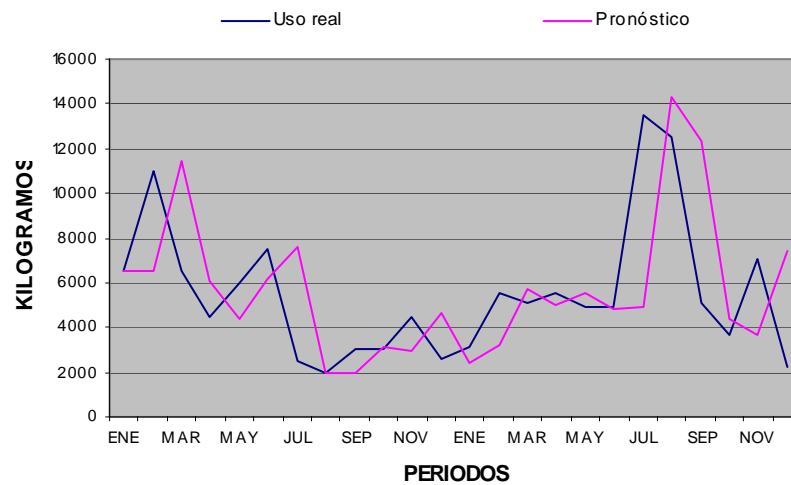




**SUAVIZAMIENTO EXPONENCIAL SIMPLE**  
**MATERIA PRIMA 3**

	MES	KGS (A)	PERIODO	PRON (F)	ERR.ABS.
2002	ENE	6500	1	6500	0
	FEB	11000	2	6500	0.40909091
	MAR	6531	3	11450	0.75317716
	ABR	4500	4	6040	0.34222222
	MAY	6000	5	4346	0.27566667
	JUN	7500	6	6166	0.17786667
	JUL	2500	7	7634	2.0536
	AGO	2000	8	1987	0.0065
	SEP	3000	9	2002	0.33266667
	OCT	3000	10	3100	0.03333333
	NOV	4500	11	2990	0.33555556
	DIC	2600	12	4651	0.78884615
2003	ENE	3160	13	2395	0.24208861
	FEB	5500	14	3237	0.41145455
	MAR	5080	15	5727	0.1273622
	ABR	5500	16	5016	0.088
	MAY	4900	17	5549	0.13244898
	JUN	4900	18	4836	0.01306122
	JUL	13456	19	4907	0.63532996
	AGO	12514	20	14311	0.14359917
	SEP	5085	21	12335	1.42576205
	OCT	3690	22	4360	0.18157182
	NOV	7075	23	3623	0.48791519
	DIC	2210	24	7421	2.35791855
<b>MAPE</b>				<b>0.48979</b>	

Valor de constante de suavizamiento  
 $\alpha = 0.1$



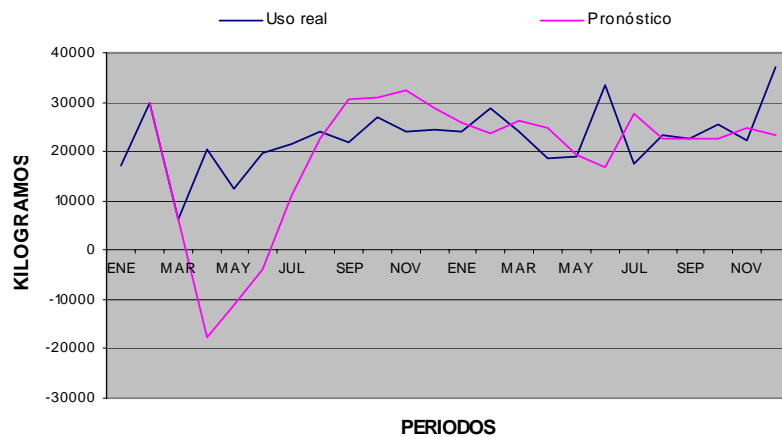
**SUAVIZAMIENTO EXPONENCIAL DOBLE O DE HOLT**  
**MATERIA PRIMA 1**

	MES	KGS (A)	PERIODO	S	T	FT	ERR. ABS.
2002	ENE	17250	1	17250	12765		
	FEB	30015	2	30015	-23815	30015	0
	MAR	6200	3	6200	-23815	6200	0
	ABR	20450	4	12837	-23815	-17615	1.861369193
	MAY	12450	5	7764.4	-11634.2	-10978	1.881767068
	JUN	19755	6	15030	-4137.32	-3870	1.195899772
	JUL	21344	7	19253.8	3422.808	10893	0.489645802
	AGO	23875	8	23635.4	6767.2848	22677	0.05017801
	SEP	22025	9	23700.6	7150.77088	30403	0.380385925
	OCT	27110	10	27858.4	4470.062528	30852	0.138030247
	NOV	23950	11	25625.8	3272.837517	32329	0.349853862
	DIC	24550	12	25419.8	591.7025101	28899	0.177148676
2003	ENE	23950	13	24362.4	-799.778494	26012	0.086096033
	FEB	28900	14	27832.6	-1459.467096	23563	0.18467128
	MAR	24150	15	24594.8	248.7197422	26374	0.092091097
	ABR	18625	16	19868.8	-462.7681547	24844	0.33390604
	MAY	19125	17	19181.4	-2452.460893	19407	0.014745098
	JUN	33600	18	30225.8	-2542.676536	16729	0.502113095
	JUL	17550	19	19576.8	2856.394079	27684	0.577435897
	AGO	23325	20	23146.8	-386.1635528	22434	0.038199357
	SEP	22750	21	22752.2	-100.8981317	22761	0.000483516
	OCT	25607	22	25016	-104.138879	22652	0.115398133
	NOV	22055	23	22626.4	841.5166726	24912	0.129539787
	DIC	36943	24	34248	-72.68999645	23468	0.364751103
<b>MAPE</b>						<b>0.38973</b>	

Valor de constantes de suavizamiento

$$\alpha = 0.8$$

$$\beta = 0.4$$



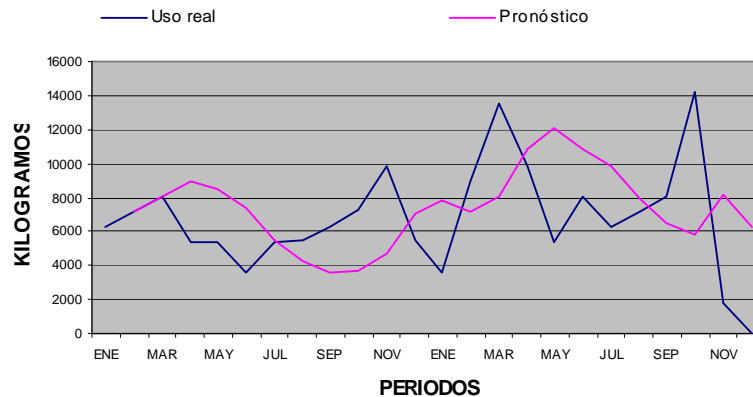
**SUAVIZAMIENTO EXPONENCIAL DOBLE O DE HOLT**  
**MATERIA PRIMA 2**

	MES	KGS (A)	PERIODO	S	T	FT	ERR. ABS.
2002	ENE	6300	1	6300	900		
	FEB	7200	2	7200	900	7200	0
	MAR	8100	3	8100	900	8100	0
	ABR	5400	4	7560	900	9000	0.666666667
	MAY	5400	5	7236	180	8460	0.566666667
	JUN	3600	6	5889.6	-432	7416	1.06
	JUL	5400	7	5434.8	-1195	5458	0.010740741
	AGO	5500	8	4744	-1206.5	4240	0.229090909
	SEP	6300	9	4642.8	-954.25	3538	0.438412698
	OCT	7227	10	5104.2	-401.625	3689	0.489553065
	NOV	9900	11	6781.8	306.1875	4703	0.524949495
	DIC	5500	12	6452.8	1345.59375	7088	0.288727273
2003	ENE	3600	13	6119.4	1028.296875	7799	1.166388889
	FEB	9000	14	7888.8	188.6484375	7148	0.205777778
	MAR	13552	15	10267.6	559.3242188	8078	0.40392562
	ABR	9900	16	10456.2	1654.162109	10827	0.093636364
	MAY	5400	17	9426.6	1469.081055	12111	1.242777778
	JUN	8021	18	9746	127.0405273	10896	0.35843411
	JUL	6300	19	8444.4	-447.4797363	9874	0.567301587
	AGO	7200	20	7678.2	-1162.239868	7997	0.110694444
	SEP	8100	21	7149.6	-1321.619934	6516	0.195555556
	OCT	14247	22	9195.6	-1004.809967	5828	0.590931424
	NOV	1800	23	5634.6	679.0950165	8191	3.550555556
	DIC	10	24	3792.4	-598.9524918	6314	630.4
<b>MAPE</b>						<b>27.9635</b>	

Valor de constantes de suavizamiento

$$\alpha = 0.4$$

$$\beta = 0.5$$



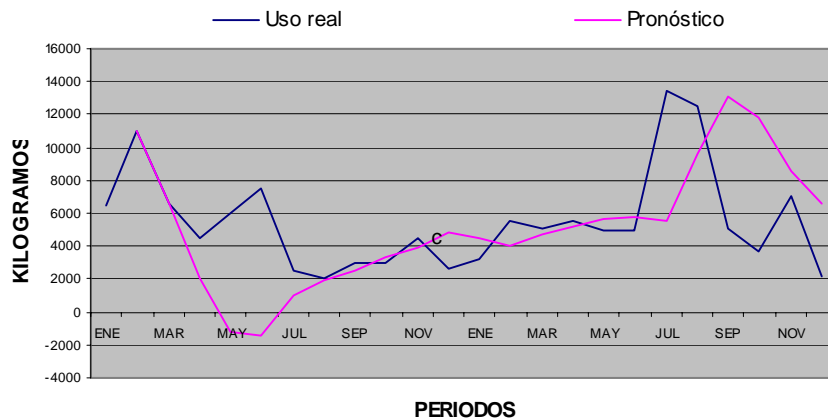
**SUAVIZAMIENTO EXPONENCIAL DOBLE O DE HOLT**  
**MATERIA PRIMA 3**

	MES	KGS (A)	PERIODO	S	T	FT	ERR. ABS.
2002	ENE	6500	1	6500	4500		
	FEB	11000	2	11000	-4469	11000	0
	MAR	6531	3	6531	-4469	6531	0
	ABR	4500	4	3281	-4469	2062	1.182347236
	MAY	6000	5	2406	-3859.5	-1188	6.050505051
	JUN	7500	6	3023	-2062.75	-1454	6.158184319
	JUL	2500	7	1730.5	176.125	961	1.601456816
	AGO	2000	8	1953.5	561.0625	1907	0.048767698
	SEP	3000	9	2757.5	584.53125	2515	0.192842942
	OCT	3000	10	3171.5	706.265625	3343	0.102602453
	NOV	4500	11	4189	620.6328125	3878	0.160391955
	DIC	2600	12	3705	776.3164063	4810	0.459459459
2003	ENE	3160	13	3821	224.1582031	4482	0.294957608
	FEB	5500	14	4773	-105.9208984	4046	0.359367276
	MAR	5080	15	4874	258.0395508	4668	0.088260497
	ABR	5500	16	5316.5	361.5197754	5133	0.071498149
	MAY	4900	17	5289.5	453.7598877	5679	0.137172037
	JUN	4900	18	5322	259.3799438	5744	0.146935933
	JUL	13456	19	9519	48.68997192	5582	1.410605518
	AGO	12514	20	11041	2017.344986	9568	0.307901338
	SEP	5085	21	9072	2754.172493	13059	0.61061337
	OCT	3690	22	7758.5	761.0862465	11827	0.688002029
	NOV	7075	23	7797.5	-1272.956877	8520	0.169600939
	DIC	2210	24	4367.5	-1633.978438	6525	0.661302682
<b>MAPE</b>						<b>0.90882</b>	

Valor de constantes de suavizamiento

$$\alpha = 0.5$$

$$\beta = 0.5$$



## MÉTODO DE WINTERS

### MATERIA PRIMA 1

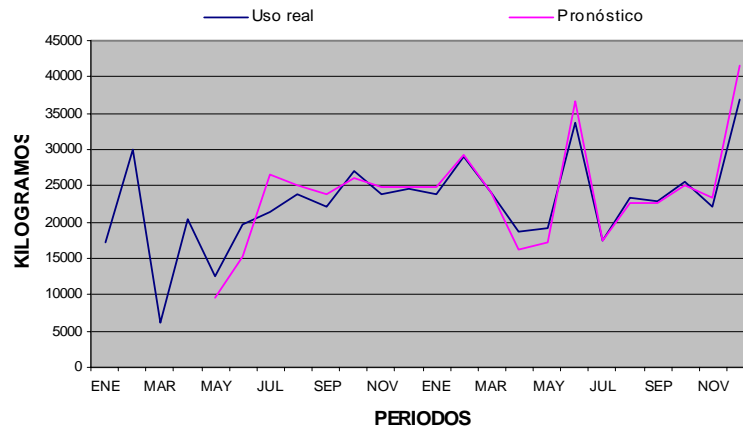
	MES	KGS	PERIODO	S	T	I	F	ERR. ABS.
2002	ENE	17250	1			5.1712571		
	FEB	30015	2			7.2581046		
	MAR	6200	3			5.0700316		
	ABR	20450	4	3145.8602	-738.3218	6.5006067		
	MAY	12450	5	2407.5384	-738.3218	5.702997	9520	0.2353414
	JUN	19755	6	2511.2713	-317.2945	7.001119	15361	0.2224247
	JUL	21344	7	3806.6639	489.0491	6.1646531	26482	0.2407234
	AGO	23875	8	3797.3299	239.85752	6.2382488	25185	0.0548691
	SEP	22025	9	3897.0411	169.78436	5.8863338	23939	0.0869012
	OCT	27110	10	3911.1556	91.949446	6.5134066	26074	0.0382147
	NOV	23950	11	3908.6629	44.728347	6.2818117	24835	0.036952
	DIC	24550	12	3938.9977	37.531581	6.2522547	24863	0.0127495
2003	ENE	23950	13	4050.303	74.418466	6.0487846	24950	0.0417537
	FEB	28900	14	4374.5461	199.33077	6.3833536	29197	0.0102768
	MAR	24150	15	3990.3212	-92.44706	6.1846281	24107	0.0017805
	ABR	18625	16	3162.7151	-460.0266	6.0072077	16236	0.1282685
	MAY	19125	17	3069.9715	-276.3851	6.1407028	17155	0.1030065
	JUN	33600	18	4769.6699	711.65668	6.6829887	36632	0.0902381
	JUL	17550	19	3366.4099	-345.8017	5.8011568	17524	0.0014815
	AGO	23325	20	3710.3901	-0.910733	6.0923033	22600	0.0310825
	SEP	22750	21	3705.726	-2.78743	6.12041	22664	0.0037802
	OCT	25607	22	3805.9228	48.704706	6.4850824	24998	0.0237826
	NOV	22055	23	3812.3879	27.584865	6.0650859	23290	0.0559964
	DIC	36943	24	5619.0991	917.14803	6.3707592	41641	0.1271689
Promedio		22731.417					<b>MAPE</b>	<b>0.0773</b>

Valor de constantes de suavizamiento

$$\alpha = 0.8$$

$$\beta = 0.5$$

$$\gamma = 0.6$$



## MÉTODO DE WINTERS

### MATERIA PRIMA 2

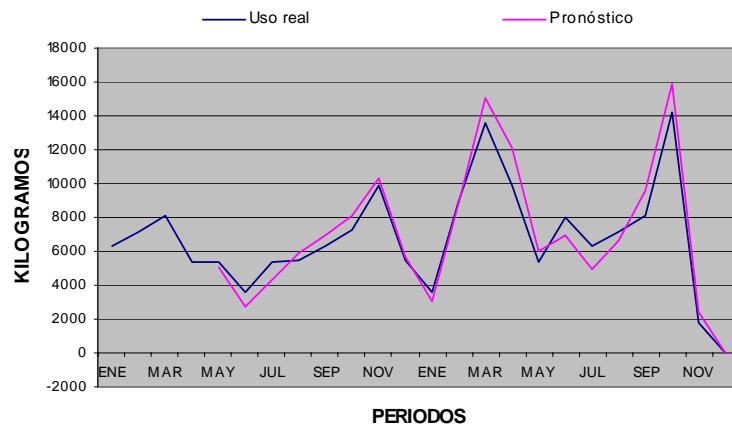
	MES	KGS	PERIODO	S	T	I	F	ERR. ABS.
2002	ENE	6300	1			5.1694619		
	FEB	7200	2			7.2600747		
	MAR	8100	3			6.6351737		
	ABR	5400	4	1094.1607	-49.56454	4.9352897		
	MAY	5400	5	1044.5962	-49.56454	5.1226274	5098	0.0559259
	JUN	3600	6	695.53024	-169.3651	5.1652513	2718	0.245
	JUL	5400	7	698.77279	-100.322	7.2153173	4319	0.2001852
	AGO	5500	8	908.03406	23.511288	6.2886966	5859	0.0652727
	SEP	6300	9	1110.5207	95.101435	5.7961508	6988	0.1092063
	OCT	7227	10	1321.7434	141.54992	5.533453	8098	0.1205203
	NOV	9900	11	1408.5659	119.65898	6.7294306	10285	0.0388889
	DIC	5500	12	1136.041	-37.21459	5.2189858	5735	0.0427273
2003	ENE	3600	13	812.19167	-151.8685	4.5897582	3031	0.1580556
	FEB	9000	14	1240.0118	80.006956	6.7243481	8877	0.0136667
	MAR	13552	15	1736.3118	246.52418	7.5889094	15048	0.1103896
	ABR	9900	16	1931.2866	225.90441	5.6186751	12121	0.2243434
	MAY	5400	17	1568.7959	-9.453604	3.8774393	6047	0.1198148
	JUN	8021	18	1339.4346	-97.41671	5.5661661	6914	0.1380127
	JUL	6300	19	994.90243	-196.2629	6.1790566	4935	0.2166667
	AGO	7200	20	1088.3203	-80.39056	6.5283706	6581	0.0859722
	SEP	8100	21	1656.5765	179.06811	5.2173559	9578	0.1824691
	OCT	14247	22	2270.0007	352.81057	6.0644388	15906	0.1164456
	NOV	1800	23	1223.9085	-206.7506	2.3894463	2431	0.3505556
	DIC	10	24	407.78223	-450.5008	0.4975076	-22	3.2
Promedio		6789.875					MAPE	0.2897

Valor de constantes de suavizamiento

$$\alpha = 0.6$$

$$\beta = 0.4$$

$$\gamma = 0.8$$



**MÉTODO DE WINTERS**  
**MATERIA PRIMA 3**

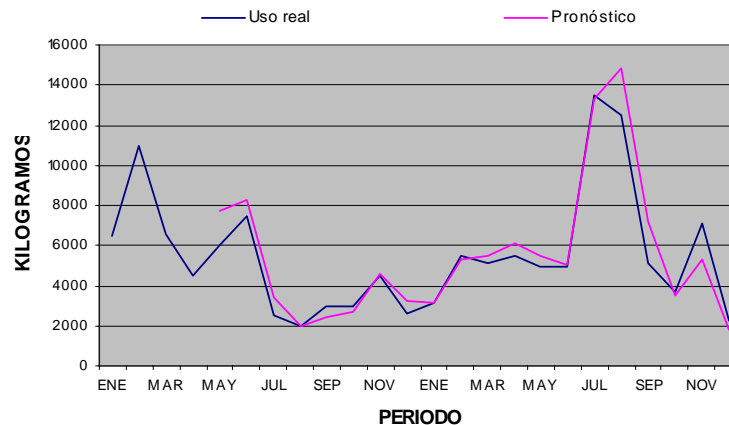
	MES	KGS (A)	PERIODO	S	T	I	F	ERR. ABS.
2002	ENE	6500	1			5.1806693		
	FEB	11000	2			6.4367262		
	MAR	6531	3			7.0791328		
	ABR	4500	4	848.5008	309.65071	5.3034717		
	MAY	6000	5	1158.1515	309.65071	5.266631	7731	0.2885
	JUN	7500	6	1255.9727	246.10185	5.4780819	8229	0.0972
	JUL	2500	7	697.82778	4.8278228	4.9094211	3450	0.38
	AGO	2000	8	474.77471	-63.53645	4.7003521	1933	0.0335
	SEP	3000	9	522.10836	-30.27542	5.0140265	2467	0.1776667
	OCT	3000	10	530.89574	-18.55658	5.2050667	2667	0.111
	NOV	4500	11	795.32526	66.339252	5.3409654	4603	0.0228889
	DIC	2600	12	645.70439	1.5512161	4.9466589	3202	0.2315385
2003	ENE	3160	13	635.33909	-2.023741	4.9547778	3138	0.006962
	FEB	5500	14	929.65852	86.87921	5.2431897	5330	0.0309091
	MAR	5080	15	970.75855	73.145458	5.2401392	5471	0.0769685
	ABR	5500	16	1091.4743	87.416548	5.1798142	6107	0.1103636
	MAY	4900	17	1045.9284	47.5278	5.0313199	5502	0.1228571
	JUN	4900	18	982.21878	14.156586	5.0185355	5001	0.0206122
	JUL	13456	19	2096.4221	344.17061	5.4385413	13274	0.0135256
	AGO	12514	20	2423.3196	338.98866	5.3561761	14796	0.1823558
	SEP	5085	21	1536.1609	-28.85554	4.7423833	7149	0.4058997
	OCT	3690	22	966.88359	-190.9821	4.4645838	3465	0.0609756
	NOV	7075	23	1143.4007	-80.73232	4.9815133	5294	0.2517314
	DIC	2210	24	607.62596	-217.245	4.5781911	1788	0.1909502
Promedio		5529.2083					<b>MAPE</b>	<b>0.1408</b>

Valor de constantes de suavizamiento

$$\alpha = 0.7$$

$$\beta = 0.3$$

$$\gamma = 0.3$$



## MÉTODO DE HOLT CON ESTACIONALIDAD

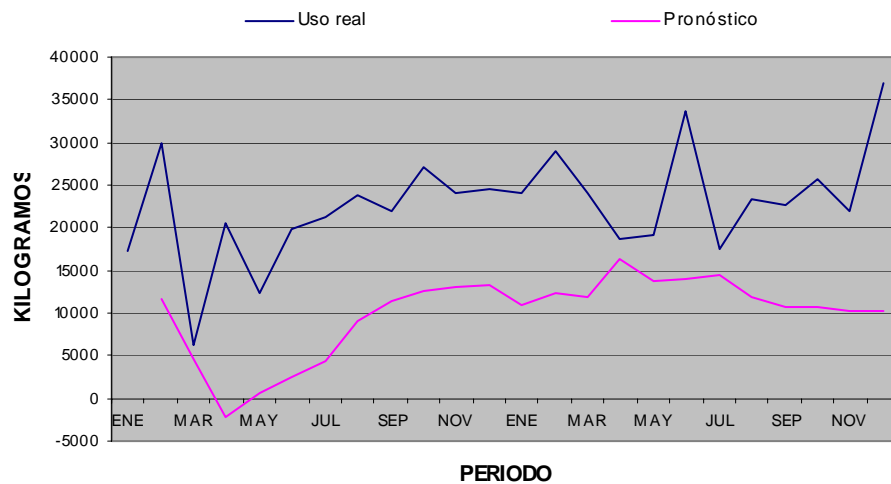
### MATERIA PRIMA 1

	MES	KGS.	PERIODO	INDICE	KGS. SIN EST. (A)	S	T	FT	ERR. ABS.
2002	ENE	17250	1	1.8124695	9517.401396	9517.4014	2063.4095		
	FEB	30015	2	2.5917874	11580.81085	11580.811	-6937.161	11581	0
	MAR	6200	3	1.3351566	4643.650192	4643.6502	-6937.161	4644	0
	ABR	20450	4	1.7189866	11896.54436	7639.5279	-6937.161	-2294	1.192788
	MAY	12450	5	1.3890467	8962.981394	6484.7972	-3957.249	702	0.9216369
	JUN	19755	6	2.347192	8416.439626	6649.7721	-2222.52	2528	0.6996892
	JUL	21344	7	1.711024	12474.40112	10060.256	-985.8529	4427	0.645093
	AGO	23875	8	2.0764214	11498.14773	10771.024	704.04839	9074	0.2107943
	SEP	22025	9	1.9697409	11181.67397	11269.694	1213.0347	11475	0.0262393
	OCT	27110	10	2.3191251	11689.75294	11927.646	1151.4209	12483	0.0678351
	NOV	23950	11	2.023851	11833.87521	12207.433	984.8961	13079	0.1052226
	DIC	24550	12	2.7051988	9075.11878	10310.282	723.40593	13192	0.4536811
2003	ENE	23950	13	1.8124695	13214.01527	12559.917	-141.2081	11034	0.1650011
	FEB	28900	14	2.5917874	11150.60582	11531.037	316.66064	12419	0.113725
	MAR	24150	15	1.3351566	18087.76647	16215.746	50.359007	11848	0.3449884
	ABR	18625	16	1.7189866	10834.87231	12464.242	1360.7735	16266	0.5012733
	MAY	19125	17	1.3890467	13768.43527	13785.409	220.21471	13825	0.0041094
	JUN	33600	18	2.347192	14314.97704	14222.171	208.33285	14006	0.0216104
	JUL	17550	19	1.711024	10257.01554	11509.062	273.29697	14431	0.4068911
	AGO	23325	20	2.0764214	11233.26894	11397.996	-603.1356	11782	0.0488807
	SEP	22750	21	1.9697409	11549.74269	11323.278	-718.4445	10795	0.0653592
	OCT	25607	22	2.3191251	11041.66372	10910.615	-559.9192	10605	0.039562
	NOV	22055	23	2.023851	10897.54145	10733.488	-468.1849	10351	0.0501807
	DIC	36943	24	2.7051988	13656.29789	12638.999	-353.3472	10265	0.24831
Promedio		22731.417						MAPE	0.2753

Valor de constantes de suavizamiento

$$\alpha = 0.7$$

$$\beta = 0.3$$





## MÉTODO DE HOLT CON ESTACIONALIDAD

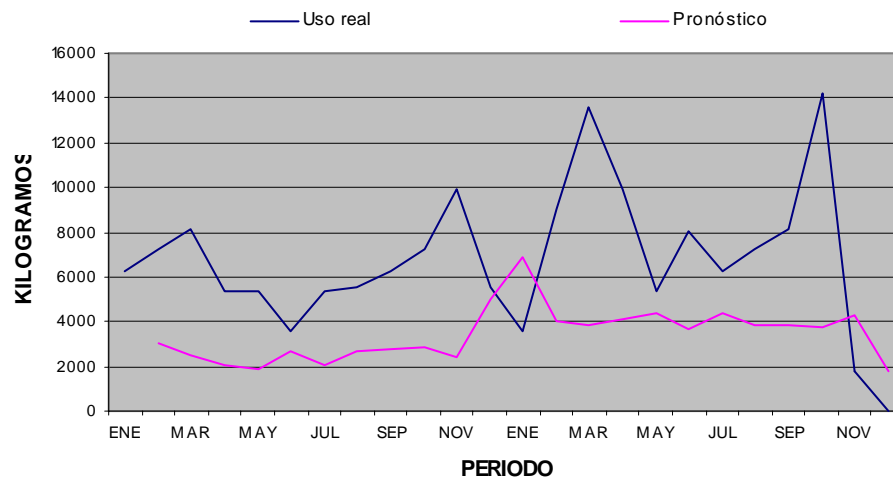
### MATERIA PRIMA 2

	MES	KGS (A)	PERIODO	INDICE	KGS. SIN EST. (A)	S	T	FT	ERR. ABS.
2002	ENE	6300	1	1.4580534	4320.829545	4320.8295	-1303.107		
	FEB	7200	2	2.3859055	3017.722222	3017.7222	-477.6341	3018	0
	MAR	8100	3	3.1888658	2540.088098	2540.0881	-477.6341	2540	0
	ABR	5400	4	2.2533552	2396.426471	2329.632	-477.6341	2062	0.1393627
	MAY	5400	5	1.5906037	3394.9375	3086.3496	-424.1985	1852	0.4544825
	JUN	3600	6	1.711519	2103.394716	2215.146	-177.3282	2662	0.265645
	JUL	5400	7	1.723154	3133.788462	2914.5943	-266.7292	2038	0.3497271
	AGO	5500	8	1.8704321	2940.497047	2881.9707	-91.37389	2648	0.0995178
	SEP	6300	9	2.1208049	2970.570313	2934.5756	-44.55278	2791	0.0605855
	OCT	7227	10	3.1626503	2285.108812	2406.0916	-15.75702	2890	0.26472
	NOV	9900	11	1.723154	5745.278846	5074.29	-112.5433	2390	0.583948
	DIC	5500	12	0.8115024	6777.552178	6414.3911	424.24782	4962	0.2679146
2003	ENE	3600	13	1.4581428	2468.893939	3342.8429	714.77669	6839	1.7699201
	FEB	9000	14	2.3860519	3771.921296	3829.061	15.617496	4058	0.0757434
	MAR	13552	15	3.1890615	4249.52611	4168.5566	-30.09424	3845	0.0952689
	ABR	9900	16	2.2534935	4393.178922	4342.2356	34.681388	4138	0.05798
	MAY	5400	17	1.5907013	3394.729167	3591.1667	75.43604	4377	0.2893273
	JUN	8021	18	1.711624	4686.192694	4482.2747	-81.71401	3667	0.2175732
	JUL	6300	19	1.7232597	3655.862179	3804.8019	81.420375	4401	0.2036998
	AGO	7200	20	1.8705469	3849.141732	3856.5578	-37.73139	3886	0.0096335
	SEP	8100	21	2.120935	3819.070313	3819.0215	-43.66427	3819	6.385E-05
	OCT	14247	22	3.1628444	4504.489749	4358.6633	-43.62525	3775	0.1618679
	NOV	1800	23	1.7232597	1044.532051	1698.6332	73.035943	4315	3.1310729
	DIC	10	24	0.8100794	12.3444697	364.20941	-450.245	1772	142.51926
Promedio		6789.875						MAPE	6.5659

Valor de constantes de suavizamiento

$$\alpha = 0.8$$

$$\beta = 0.2$$



## MÉTODO DE HOLT CON ESTACIONALIDAD

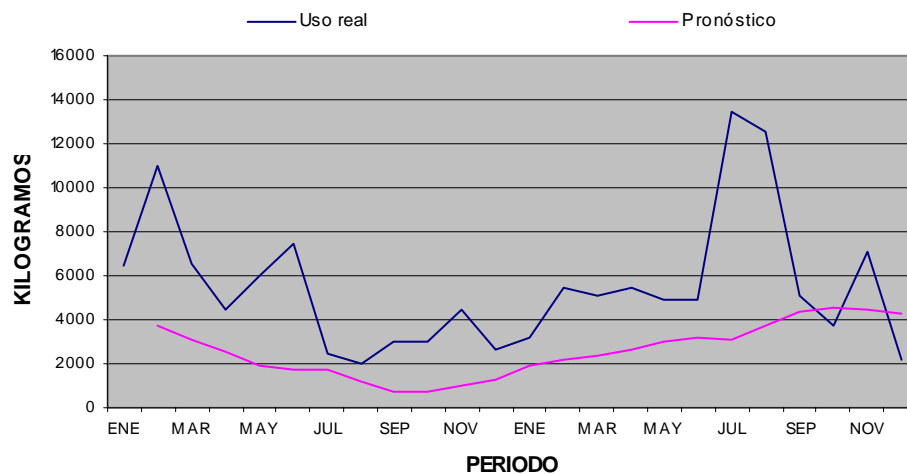
### MATERIA PRIMA 3

	MES	KGS (A)	PERIODO	INDICE	KGS. SIN EST. (A)	S	T	FT	ERR. ABS.
2002	ENE	6500	1	1.7470856	3720.481798	3720.4818	-34.34291		
	FEB	11000	2	2.9841523	3686.138889	3686.1389	-576.0485	3686	0
	MAR	6531	3	2.099939	3110.090399	3110.0904	-576.0485	3110	0
	ABR	4500	4	1.8085772	2488.14375	2520.2725	-576.0485	2534	0.0184467
	MAY	6000	5	1.9713491	3043.600917	2274.0371	-581.5563	1944	0.3612093
	JUN	7500	6	2.2426357	3344.279234	2188.0203	-449.631	1692	0.4939176
	JUL	2500	7	2.8857657	866.3211853	1476.7689	-251.4152	1738	1.0066337
	AGO	2000	8	2.6249689	761.9137844	1086.3217	-356.0634	1225	0.6082576
	SEP	3000	9	1.4622346	2051.654298	1126.6771	-411.6762	730	0.6440637
	OCT	3000	10	1.2099381	2479.46562	1244.3403	-253.1087	715	0.711631
	NOV	4500	11	2.0934281	2149.584233	1338.7374	-41.37289	991	0.5388728
	DIC	2600	12	0.8699256	2988.761261	1804.7836	97.629418	1297	0.565919
2003	ENE	3160	13	1.7470856	1808.726536	1874.307	300.59702	1902	0.0517969
	FEB	5500	14	2.9841523	1843.069444	2075.3537	289.35465	2175	0.1800446
	MAR	5080	15	2.099939	2419.117934	2381.0312	249.53449	2365	0.0224915
	ABR	5500	16	1.8085772	3041.064583	2753.7154	256.06365	2631	0.1349853
	MAY	4900	17	1.9713491	2485.607416	2852.5275	305.32351	3010	0.2108827
	JUN	4900	18	2.2426357	2184.929099	2865.9745	242.42292	3158	0.4452877
	JUL	13456	19	2.8857657	4662.887148	3574.7443	125.67229	3108	0.3333749
	AGO	12514	20	2.6249689	4767.294549	4020.48	312.21106	3700	0.2237911
	SEP	5085	21	1.4622346	3477.554035	4076.1499	440.23641	4333	0.2459019
	OCT	3690	22	1.2099381	3049.742713	4076.3933	337.61997	4516	0.4809073
	NOV	7075	23	2.0934281	3379.6241	4103.6965	161.62273	4414	0.3060663
	DIC	2210	24	0.8699256	2540.447072	3747.8576	37.496039	4265	0.678964
Promedio		5529.2083						MAPE	0.3592

Valor de constantes de suavizamiento

$$\alpha = 0.3$$

$$\beta = 0.4$$



**MÉTODO DE WINTERS**  
**MATERIA PRIMA 8**

	MES	KGS	PERIODO	S	T	I	F	ERR. ABS.
2002	ENE	10	1			4.644203		
	FEB	10	2			4.1991502		
	MAR	5250	3			5.9545092		
	ABR	5000	4	543.35201	102.61459	9.2021377		
	MAY	3000	5	645.9666	102.61459	6.4673768	4842	0.614
	JUN	10	6	151.62139	-136.1693	2.626523	41	3.1
	JUL	2165	7	293.96241	-24.76519	5.4695415	1473	0.3196305
	AGO	5405	8	523.73026	77.048027	8.3799354	5035	0.0684551
	SEP	2105	9	380.53943	-11.04752	6.6709469	2465	0.1710214
	OCT	3000	10	987.65395	236.2173	4.4908794	5497	0.8323333
	NOV	10	11	246.23689	-154.8364	1.8207186	167	15.7
	DIC	3300	12	333.31832	-58.0693	6.668555	1836	0.4436364
2003	ENE	5000	13	654.66483	93.697028	7.2499196	5426	0.0852
	FEB	3240	14	726.84217	85.089154	5.5745512	4527	0.3972222
	MAR	6380	15	2965.6751	946.58666	3.520589	13774	1.1589342
	ABR	3128	16	1157.7061	-155.2356	3.0293725	3037	0.0290921
	MAY	3000	17	531.53224	-343.6109	4.5981851	865	0.7116667
	JUN	3135	18	487.48596	-223.7851	5.6978467	1503	0.5205742
	JUL	4040	19	970.76839	59.041941	4.7761298	4919	0.2175743
	AGO	6116	20	1821.082	375.55062	3.9255176	8623	0.4099084
	SEP	3143	21	986.15097	-108.6421	3.4824903	3056	0.0276806
	OCT	5305	22	920.34456	-91.5078	4.8514834	4022	0.2418473
	NOV	3000	23	668.26626	-155.736	4.6341305	2376	0.208
	DIC	9265	24	1990.6647	435.51777	4.6461868	11273	0.2167296
Promedio		3500.7083					<b>MAPE</b>	<b>1.2736</b>

Valor de constantes de suavizamiento

$$\alpha = 0.8$$

$$\beta = 0.4$$

$$\gamma = 0.6$$

